TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

ANALYTICAL REPORT

Perfluorocarbon (PFC) Analysis

Lot #: D9L180621

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Case Narrative
D9L180621

TestAmerica Denver utilizes USEPA approved methods in all analytical work. The samples presented in this report were analyzed for the parameters listed on the methods summary page in accordance with the methods indicated. Dilution factors and footnotes are provided on each datasheet to assist in the interpretation of the results.

The results relate only to the samples in this report and meet all requirements of NELAC. All data have been reviewed for compliance with the laboratory QA/QC plan and have found to be compliant with laboratory protocols with any exceptions noted below.

Please note that Non-Detect (ND) results have been evaluated down to the Method Detection Limit (MDL) and should be considered ND at the MDL. Unless otherwise noted, results for solids have been dry weight corrected.

Sample Arrival and Receipt
The following report contains the analytical results for two samples received at TestAmerica Denver on December 18, 2009, according to documented sample acceptance procedures. The samples were received in good condition at a temperature of 2.2°C. No anomalies were encountered during sample receipt.

Standards
Analytical standards were prepared using commercially available certified solutions containing all compounds of interest.

The mass labeled compounds 13C4 PFBA, 13C2 PFHxA, 18O2 PFHxS, 13C4 PFOA, 13C4 PFOS, 13C5 PFNA, 13C2 PFDA, 13C2 PFUnA, 13C2 PFDoA, and D3 MeFOSA were introduced at the extraction step and were used for internal standards for the quantitation of the target compounds.

Sample Extraction and Analysis
The samples presented in this report were extracted for the target analytes by TestAmerica Denver's Standard Operating Procedure (SOP) DV-OP-0019 and analyzed for the target analytes by TestAmerica Denver's SOP DV-LC-0012.

Method QC Samples
The Method Blank is processed reagent water spiked with internal standard and prepared with each batch of 20 samples of the same matrix. The method blanks were non-detect at the reporting limits for the target analytes.

Each batch is prepared with low and mid level Laboratory Control Samples (LCS). The LCS recoveries for both levels were within established control limits, with the exception of the items noted in section Analytical Comments.

Analytical Comments
The Standard Operating Procedure (SOP) was altered slightly in the sample preparation for FOSA. Sodium hydroxide was added to both samples to obtain a pH of 12 instead of the SOP required <2. The basic pH is generating better internal standard recoveries for MeFOSA.

The low-level LCS associated with QC batch 9357104 exhibited percent recoveries below the QC control limits for Perfluorobutanoic acid (PFBA), Perfluorohexanoic acid (PFHxA), Perfluoroundecanoic acid (PFUnA), and Perfluorohexane sulfonate (PFHxS). This is an indicator that data may be biased low. The mid-level LCS/LCSD were within control limits and the low bias is not significant enough to impact the ability for the laboratory to detect at the reporting limits; therefore, corrective action is deemed unnecessary.

Due to a limitation in the LIMS system, the low-level LCS associated with QC batch 9357104 reported the percent recoveries for several PFCs as 0.0%. These compounds were recovered within the control limits except for PFNA, PFDoA, PFTriA, and PFTeA, as outlined below.

Compound	Low-Level LCS Actual Recovery	Control Limits	Low-Level LCS Actual Result	MDL
PFNA	67%	74-138%	0.01335 ug/kg	0.500 ug/kg
PFDoA	43%	60-154%	0.00868 ug/kg	0.819 ug/kg
PFTriA	39%	44-164%	0.00775 ug/kg	1.15 ug/kg
PFTeA	44%	47-172%	0.00878 ug/kg	1.45 ug/kg

As the compounds were detected below the Method Detection Limits (MDL), the system reports the percent recoveries as 0.0%. Please note PFDS is not a target compound for this project.

The method required MS/MSD could not be performed for QC batches 9357104 and 9357106, due to insufficient sample volume. Method precision and accuracy have been verified by the acceptable low-level LCS and mid-level LCS/LCSD analyses data.

The Standard Operating Procedure (SOP) was altered slightly for these samples in the sample prep and LC conditions. The alterations are listed below.

Solvents are now the same as they were in the original SOP and run per the following gradient: From 0 to 11 minutes, the flow rate is 0.4 mL/minute and the MeOH ramps up from 25% to 100%. From 11 to 11.01 minutes, the flow rate increases to 0.7 mL/minute and this flow is diverted from the MS. At 13 minutes the flow rate decreases back down to 0.4 mL/minute and 25% MeOH. The column then equilibrates to 14 minutes.

PFTriA and PFTeA now use 13C2 PFUnA as their internal standard instead of 13C2 PFDoA.

No other anomalies were observed.

EXECUTIVE SUMMARY - Detection Highlights

D9L180621

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
175 HARRISON LANE 12/16/09 11:33 002				
Perfluoropentanoic acid (PFPA)	0.013 J	0.030	ug/L	DEN -LC-0012
Perfluorohexane sulfonate (PFH	0.015 J	0.030	ug/L	DEN -LC-0012
Perfluorohexanoic acid (PFHxA)	0.014 J	0.020	ug/L	DEN -LC-0012
Perfluorobutane sulfonate (PFB	0.019 J	0.020	ug/L	DEN -LC-0012
Perfluorooctanoic Acid	0.015 J	0.020	ug/L	DEN -LC-0012

METHODS SUMMARY

D9L180621

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
LC/MS/MS PFCs	DEN -LC-0012	SW846 FOSA spec

References:

DEN Severn Trent Laboratores, Denver, Facility Standard Operating Procedure.

METHOD / ANALYST SUMMARY

D9L180621

ANALYTICAL METHOD	ANALYST	ANALYST ID
DEN -LC-0012	Teresa L. Williams	002510

References:

DEN Severn Trent Laboratores, Denver, Facility Standard Operating Procedure.

SAMPLE SUMMARY

D9L180621

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
LRDKT	001	743 ARTIS CHARLES RD	12/16/09	11:05
LRDKV	002	175 HARRISON LANE	12/16/09	11:33

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

Dalton Utilities

Client Sample ID: 743 ARTIS CHARLES RD

HPLC

Lot-Sample #...: D9L180621-001 **Work Order #...:** LRDKT1AA **Matrix.....:** WATER
Date Sampled...: 12/16/09 11:05 **Date Received..:** 12/18/09
Prep Date.....: 12/23/09 **Analysis Date..:** 01/09/10
Prep Batch #...: 9357104 **Analysis Time..:** 06:56
Dilution Factor: 1
Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Perfluoroheptanoic acid (PFHpA)	ND	0.030	ug/L	0.013
Perfluorononanoic acid (PFNA)	ND	0.040	ug/L	0.017
Perfluorododecanoic acid (PFDoA)	ND	0.030	ug/L	0.015
Perfluorotridecanoic acid (PFTriA)	ND	0.040	ug/L	0.018
Perfluorotetradecanoic acid (PFTeA)	ND	0.030	ug/L	0.015
Perfluoropentanoic acid (PFPA)	ND	0.030	ug/L	0.011
Perfluorohexane sulfonate (PFHxS)	ND	0.030	ug/L	0.0070
Perfluorobutanoic acid (PFBA)	ND	0.020	ug/L	0.0098
Perfluorohexanoic acid (PFHxA)	ND	0.020	ug/L	0.0029
Perfluorodecanoic acid (PFDA)	ND	0.020	ug/L	0.0078
Perfluoroundecanoic acid (PFUnA)	ND	0.020	ug/L	0.0069
Perfluorobutane sulfonate (PFBS)	ND	0.020	ug/L	0.0082
Perfluorooctanesulfonate	ND	0.030	ug/L	0.013
Perfluorooctanoic Acid	ND	0.020	ug/L	0.0098

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
13C4 PFOA	108	(60 - 155)
13C4 PFOS	60	(45 - 130)
13C4 PFBA	113	(36 - 130)
13C2 PFHxA	111	(55 - 135)
18O2 PFHxS	99	(61 - 130)
13C5 PFNA	84	(54 - 132)
13C2 PFDA	53	(53 - 130)
13C2 PFUnA	46	(37 - 130)
13C2 PFDoA	47	(26 - 130)

Dalton Utilities

Client Sample ID: 743 ARTIS CHARLES RD

HPLC

Lot-Sample #...: D9L180621-001 **Work Order #...:** LRDKT1AC **Matrix.....:** WATER
Date Sampled...: 12/16/09 11:05 **Date Received..:** 12/18/09
Prep Date.....: 12/23/09 **Analysis Date..:** 12/30/09
Prep Batch #...: 9357106 **Analysis Time..:** 18:02
Dilution Factor: 1
Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Perfluorooctane sulfonamide (FOSA)	ND	0.050	ug/L	0.0057

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
MeFOSA	48	(37 - 130)

Dalton Utilities

Client Sample ID: 175 HARRISON LANE

HPLC

Lot-Sample #...: D9L180621-002 **Work Order #...:** LRDKV1AA **Matrix.....:** WATER
Date Sampled...: 12/16/09 11:33 **Date Received..:** 12/18/09
Prep Date.....: 12/23/09 **Analysis Date..:** 01/09/10
Prep Batch #...: 9357104 **Analysis Time..:** 07:11
Dilution Factor: 1
Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Perfluoroheptanoic acid (PFHpA)	ND	0.030	ug/L	0.013
Perfluorononanoic acid (PFNA)	ND	0.040	ug/L	0.017
Perfluorododecanoic acid (PFDoA)	ND	0.030	ug/L	0.015
Perfluorotridecanoic acid (PFTriA)	ND	0.040	ug/L	0.018
Perfluorotetradecanoic acid (PFTeA)	ND	0.030	ug/L	0.015
Perfluoropentanoic acid (PFPA)	**0.013 J**	**0.030**	**ug/L**	**0.011**
Perfluorohexane sulfonate (PFHxS)	**0.015 J**	**0.030**	**ug/L**	**0.0070**
Perfluorobutanoic acid (PFBA)	ND	0.020	ug/L	0.0098
Perfluorohexanoic acid (PFHxA)	**0.014 J**	**0.020**	**ug/L**	**0.0029**
Perfluorodecanoic acid (PFDA)	ND	0.020	ug/L	0.0078
Perfluoroundecanoic acid (PFUnA)	ND	0.020	ug/L	0.0069
Perfluorobutane sulfonate (PFBS)	**0.019 J**	**0.020**	**ug/L**	**0.0082**
Perfluorooctanesulfonate	ND	0.030	ug/L	0.013
Perfluorooctanoic Acid	**0.015 J**	**0.020**	**ug/L**	**0.0098**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
13C4 PFOA	108	(60 - 155)
13C4 PFOS	61	(45 - 130)
13C4 PFBA	110	(36 - 130)
13C2 PFHxA	110	(55 - 135)
18O2 PFHxS	95	(61 - 130)
13C5 PFNA	82	(54 - 132)
13C2 PFDA	63	(53 - 130)
13C2 PFUnA	56	(37 - 130)
13C2 PFDoA	55	(26 - 130)

NOTE(S):

J Estimated result. Result is less than RL.

Dalton Utilities

Client Sample ID: 175 HARRISON LANE

HPLC

Lot-Sample #...: D9L180621-002 **Work Order #...:** LRDKV1AC **Matrix.....:** WATER
Date Sampled...: 12/16/09 11:33 **Date Received..:** 12/18/09
Prep Date.....: 12/23/09 **Analysis Date..:** 12/30/09
Prep Batch #...: 9357106 **Analysis Time..:** 18:07
Dilution Factor: 1
Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Perfluorooctane sulfonamide (FOSA)	ND	0.050	ug/L	0.0057

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
MeFOSA	48	(37 - 130)